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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/196,683	11/20/1998	SEIJI MIZUNO	2013/14	9431

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EXAMINER

CREPEAU, JONATHAN

ART UNIT	PAPER NUMBER
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1746

DATE MAILED: 05/06/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/196,683	Applicant(s) MIZUNO, SEIJI	
	Examiner Jonathan S. Crepeau	Art Unit 1746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 February 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,4-12 and 17-19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,4-12 and 17-19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on January 29, 2003 has been entered.

This Office action addresses claims 1, 4-12, and 17-19. Although the claims have been amended, they remain rejected under 35 USC §103 over the art of record.

Claim Rejections - 35 USC §103

2. Claims 8-12, 18, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 7-249417 in view of Chow et al (U.S. Patent 5,284,718), in view of Pereira et al (U.S. Patent 6,044,842).

Regarding claims 8, 18, and 19, in the abstract and Figure 1, JP 7-249417 discloses a fuel cell stack comprising polymer electrolyte membranes (30), support frames (100), and separators (200). The membranes are bonded to the support frames with a layer of adhesive (410). The support frames are subsequently bonded to the separators with another layer of adhesive (420). Thus, the membranes are bonded to the separators via the support frames and the two adhesive layers. Regarding claims 8, 10, 18, and 19, the separators are made of dense, gas-impermeable

carbon and are arranged across gas diffusion electrodes (40) (see Figs 1, 3; paragraph 30 of the machine translation). Regarding claim 11, the adhesive 420 may comprise a mixture of epoxy resin and denatured (i.e., “modified”) silicone (see paragraph 34). Regarding claim 12, spherical spacer beads (60) made of polystyrene are mixed with the adhesive 410 (see paragraph 24).

JP 7-249417 does not expressly teach that the adhesives have a durometer A hardness of not greater than 90 (claims 9 and 19), or a modulus of elasticity of not greater than 10 MPa (claims 8 and 18) after cure.

In column 2, line 63 et seq., Chow et al. teach that the use of sealing material between a polymer electrolyte membrane and an electrically conductive plate is known, and that the sealant material deteriorates because it is “not sufficiently resilient to withstand compressive forces over time.”

In column 3, lines 1, 2, and 44-59, Pereira et al. disclose an adapter member (20) comprising a “resilient, thermoplastic elastomer” (e.g., silicone) having a durometer A hardness of approximately 50-80, preferably 50-70. Furthermore, the reference teaches that durometer hardness measurements “generally correlate to the elastic modulus or resiliency of rubber compounds under conditions of relatively small strain.”

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated by the disclosure of Chow et al. to make the seals of the Japanese reference as resilient (elastic) as possible, in hopes of reducing the deterioration of the seals over time. Furthermore, according to the disclosure of Pereira et al., the resiliency, modulus of elasticity, and durometer hardness of a material are generally interrelated quantities (i.e., the durometer hardness and modulus of

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elasticity are proportional, and both are inversely proportional to the resiliency). As noted above, Chow et al. provides motivation to increase the resiliency of the seals of the Japanese reference, thereby providing motivation to use a material having a low durometer A hardness (i.e., less than 90) and low modulus of elasticity (i.e., less than 10 MPa). As also noted above, Pereira et al. teach a “resilient” material which has a durometer A hardness of 50-80. Accordingly, in view of the teachings of Chow et al. and Pereira et al., the claimed ranges of durometer hardness and elastic modulus in the adhesives 410 and 420 of the Japanese reference would be rendered obvious to a skilled artisan.

3. Claims 1, 4-7 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 7-249417 in view of Chow et al. in view of Pereira et al. as applied to claims 8-12, 18, and 19 above, and further in view of Palmer (U.S. Patent 4,804,451).

The Japanese reference does not expressly teach that the polymer electrolyte has a molar water fraction of less than 4.

The patent of Palmer is generally directed to electrodialysis and electrodeionization apparatuses using ion exchange membranes. In column 1, lines 47-61, the reference teaches that in devices in which membranes are bonded to frames with an adhesive, the bonds are weak because the membrane surfaces are wet.

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated by the

disclosure of Palmer to reduce the water content of the membrane of the Japanese reference prior to bonding in hopes of improving the sealability of the membrane with the frames. Accordingly, the recitation of a molar water fraction of less than 4 is not considered to patentably distinguish over the references.

Response to Arguments

4. Applicant's arguments filed January 29, 2003 have been fully considered but they are not persuasive.

Applicant asserts that the Examiner has used hindsight to combine the references and that no motivation exists for combining the references. In response, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). In this case, it is submitted that the judgment of obviousness only takes into account knowledge that was within the level of skill in the art. This is believed to be borne out by the references, which also supply proper motivation for making the combination. In particular, the Chow et al. reference provides strong motivation to use a "resilient" sealing material. The artisan may then look to the patent of Pereira et al. for the specific properties of a resilient silicone or urethane material, which are the same materials used in the seals of the JP '417 reference.

Regarding the Palmer reference, Applicant asserts that “there is no suggestion or motivation within the references as to why one of ordinary skill in the art would combine the teaching of a fuel cell assembly with that of [...]electrodialysis to achieve the claimed invention.” However, it is submitted that Palmer is analogous art with respect to the claimed invention and provides sufficient motivation for combination of itself with the JP ‘417 reference. Pursuant to MPEP §2141.01(a), in order to rely on a reference as a basis for rejection of an applicant’s invention, the reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned. *In re Oetiker*, 977 F.2d 1443, 1446, 24 USPQ2d 1443, 1445 (Fed. Cir. 1992). It is submitted that the problem faced by Applicants was improving the sealing between an ion-exchange membrane and a support member. Accordingly, the Palmer reference is believed to be analogous art, as it is also concerned with improving the sealing between an ion-exchange membrane and a support member. Additionally, the reference is believed to provide strong motivation to use dry membranes (to increase bond strength, as noted above) in making the fuel cells of JP ‘417.

Finally, the Applicant submits that that “none of the cited references teach or suggest a polymer electrolyte film being fixed to a gas-impermeable dense carbon separator.” However, it is submitted that the JP ‘417 reference does in fact teach that the electrolyte is “fixed” to such a carbon separator. As noted in section 2 above, the electrolyte is bonded to a support frame (100), which is subsequently bonded to a gas-impermeable carbon separator. Therefore, while the electrolyte is not bonded *directly* to the carbon separator, it is still “fixed” thereto via the support frame. An amendment reciting that the electrolyte is bonded directly to the separator is therefore suggested. The Examiner agrees with Applicant’s statement that the support frame of the

reference is not a "gas-impermeable dense carbon separator" since is formed from a polymeric resin. Accordingly, the term "carbon separator" is interpreted herein as a separator requiring some form of elemental carbon to be present therein.

Conclusion


5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan Crepeau whose telephone number is (703) 305-0051. The examiner can normally be reached Monday-Friday from 9:30 AM - 6:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy Gulakowski, can be reached at (703) 308-4333. The phone number for the organization where this application or proceeding is assigned is (703) 305-5900. Additionally, documents may be faxed to (703) 305-5408 or (703) 305-5433.

Any inquiry of general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

JSC

May 2, 2003


Jonathan Crepeau
Patent Examiner
Art Unit 1746